INSECTS OF MICRONESIA
Diptera: Simuliidae

By **ALAN STONE**

ENTOMOLOGY RESEARCH DIVISION, AGRICULTURAL RESEARCH SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

INTRODUCTION

In Micronesia, the family Simuliidae is poorly represented and little known. Except for a single female collected on Ogasawara Island, no Simuliidae have been reported previously from Micronesia, although other species are known from Polynesia and Melanesia. Listed in this report are two species from Guam (one of these from Truk also), one from the Palau Islands, and one from the Bonin Islands, all probably endemic. No immature stages are associated with the four species. There are no records of any of these species attacking man.

The United States Office of Naval Research, the Pacific Science Board (National Research Council), the National Science Foundation, and Bernice P. Bishop Museum have made this study and publication of the results possible. Field research was aided by a contract between the Office of Naval Research, Department of the Navy, and the National Academy of Sciences, NR 160-175. The illustrations accompanying this paper were made by S. Ohtawa, M. Hasunuma, and S. Shibata, of the 406th Medical General Laboratory, U. S. Army, Japan, through the courtesy of Captain Wallace E. Murdoch, Major Gordon Field, and commanding officers of the 406th Laboratory. Acknowledgement is also made to the U. S. Army Medical Research and Development Command, Washington, D.C., for support of this scientific drawing project.

The abbreviations of type depositories are as follows: US (United States National Museum), BISHOP (B. P. Bishop Museum), CM (Chicago Natural History Museum).

DISTRIBUTIONAL LIST OF MICRONESIAN SIMULIIDAE

1. Simulium (Eusimulium) trukense: Mariana Is. (Guam); Caroline Is. (Truk).
2. Simulium (E.) palauense: Caroline Is. (Palau).
3. Simulium (E.) guamense: Mariana Is. (Guam).
4. Simulium (E.) bonninense: Bonin Is. (Haha Jima).

SYSTEMATICS

All of the Micronesian species are closely related and fall into the current definition of the subgenus *Eusimulium,* genus *Simulium,* although in a different species group from the type species. It is possible that further study will show either *Cnetha* or *Nevermannia* to be a more appropriate name for the group.

Genus **Simulium** Latreille

Simulium Latreille, 1802, Hist. Nat. Crust. Ins. **3**: 426. Type species, *Rhagio colombaschensis* Fabricius.

Simulium, subgenus *Eusimulium* Roubaud, 1906, [Paris] Acad. Sci. Compt. Rend. **143**: 521. Type species, *Simulium aureum* Fries.

Cnetha Enderlein, 1921, Deutsch. Tier. Wochenschr. **29**: 199. Type species, *Atractocera latipes* Meigen.

Nevermannia Enderlein, 1921, Deutsch. Tier. Wochenschr. **29**: 199. Type species, *Simulium annulipes* Becker (= ? *S. ruficorne* Macquart).

Diagnostic characters that the Micronesian species share are: Antenna with nine flagellomeres; base of cibarium without median teeth; costa with stout, spinelike setae mixed with finer ones; radial sector not forked; basal portion of radial vein with hairs dorsally; vein Cu distinctly curved twice; no basal cell present; pleural membrane bare; anterior tarsus not greatly enlarged or hairy; calcipala (posterior lobe at apex of first hind tarsomere) and pedisulcus (dorsal notch near base of second hind tarsomere) well developed; tarsal claw of female with a well-developed projection from base more or less parallel with main tooth; posterior abdominal tergites hairy or scaly; distimere of male terminalia with a single apical tooth.

It does not seem necessary to give the very extensive and, at present, uncertain synonymy for this large, world-wide genus.

Because the pinned material of all but *bonninense* is in poor condition, and because only the male of *guamense* and female of *bonninense* are known, a key to the Micronesian species is difficult to prepare. It is hoped that the following key and the illustrations will serve to distinguish them. It is probable that the species are of limited distribution, although *trukense* is found on both Guam and Truk.

Key to Micronesian Simulium Species

1. Scape and pedicel dark reddish brown to nearly black; wing not less than 2.3 mm. long .... **4. bonninense**
   Scape and pedicel yellow to light brown; wing not more than 2.0 mm. long 2
2. Antenna entirely yellow; fringe of first abdominal segment of male yellow .... **3. guamense**
   Most of flagellum fuscous; fringe of first abdominal segment of male dark coppery brown 3

3. Posterior surface of first hind tarsomere with not more than apical fifth darkened; frons at narrowest 0.05 to 0.07 mm. wide..................................**1. trukense**
   Posterior surface of first hind tarsomere with at least apical third darkened; frons at narrowest 0.08 to 0.10 mm. wide..................................**2. palauense**

1. Simulium (Eusimulium) trukense Stone, n. sp. (fig. 1).

In addition to the characters illustrated and those given for the subgenus, the following are to be noted:

Female: Wing length 1.8 mm. Scape, pedicel, and base of first flagellomere yellow, remainder of antenna dark. Recumbent narrow scales of head, thorax, legs, and abdomen pale yellow; erect hairs of scutellum and posterior abdominal segments dark. Hairs of stem vein dark. Halter pale yellow. Calcipala unusually large, reaching beyond pedisulcus. Terga 8 and 9 dark brown, shiny.

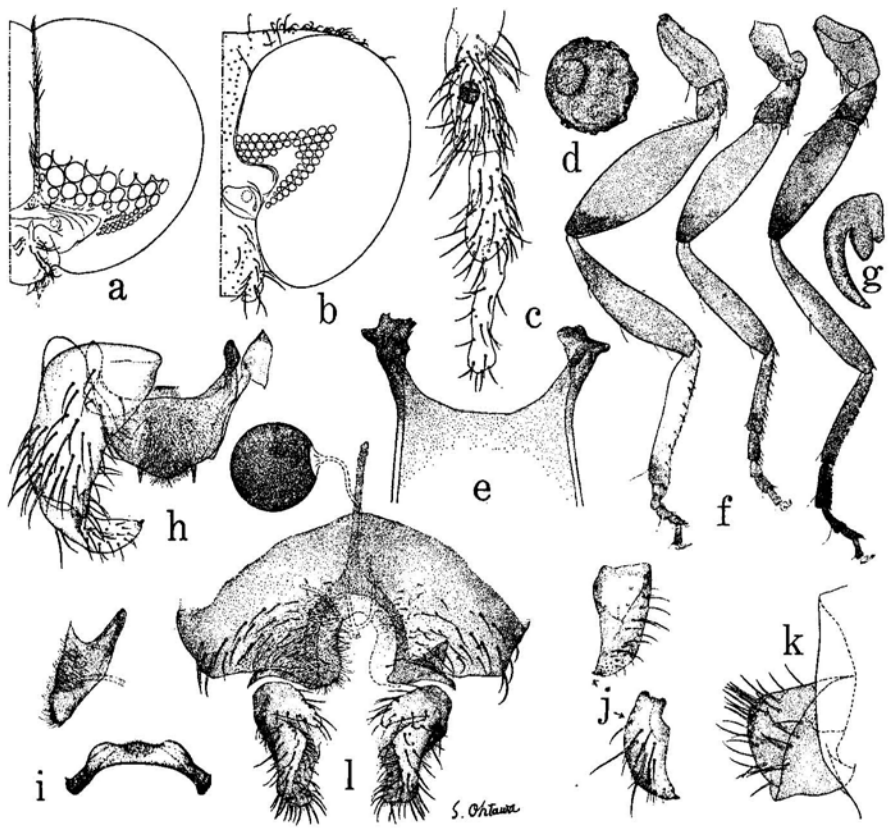


FIGURE 1.—*Simulium* (*Eusimulium*) *trukense:* **a,** head, male, front view; **b,** head, female, front view; **c,** palpus, female; **d,** palpal sensory vesicle; **e,** base of cibarium, female; **f,** left hind, mid, and fore legs, female; **g,** claw, female; **h,** terminalia, male, ventral view; **i,** ventral plate, male terminalia; **j,** distimere, male terminalia; **k,** female terminalia, lateral view; **l,** female terminalia, ventral view.

Male: Scarcely differing from female except in the usual sexual characters of eyes, tarsal claws, and somewhat more convex thorax. Gray pollinose areas on sides of tergites 2, 5, and 6; tergites 7 and 8 brown, opaque.

Larva and pupa unknown.

Holotype, female (US 65051), Moen I., Truk, 600 ft., July 31, 1946, Townes. Paratypes, Truk (US, BISHOP): female, four males, same data as holotype; four males, same, but at 100 ft.; female, Moen I., February 23,

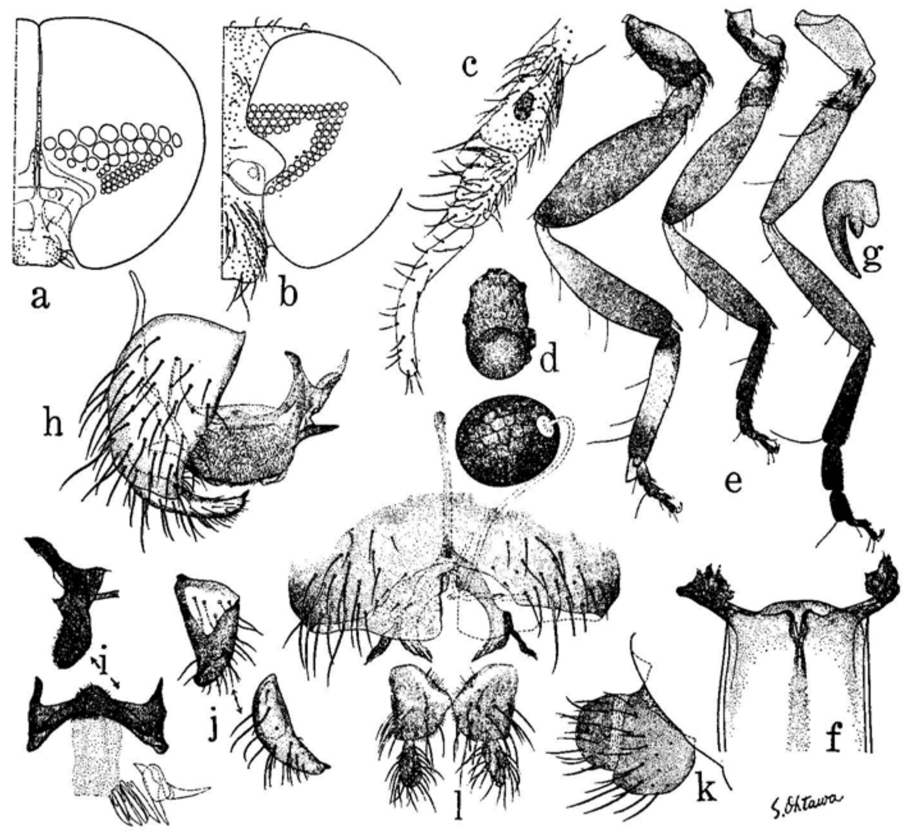


FIGURE 2.—*Simulium* (*Eusimulium*) *palauense:* **a,** head, male, front view; **b,** head, female, front view; **c,** palpus, female; **d,** palpal sensory vesicle; **e,** left hind, mid, and fore legs, female; **f,** base of cibarium, female; **g,** claw, female; **h,** terminalia, male, ventral view; **i,** ventral plate, male terminalia; **j,** distimere, pale terminalia; **k,** female terminalia, lateral view; **l,** female terminalia, ventral view.

1929, Potts; male, Moen I., June 2, 1946, Townes; eight males, Mt. Unibot, Tol I., Dec. 30, 1952, Gressitt; male, same, Dec. 31; three males, same, January 3, 1953. Guam: female, Piti, October 29, 1936, Swezey; female, Mt. Lamlam, October 1952, Krauss; female, Mt. Lamlam, 400 m., Nov. 27, 1952, Gressitt; two females, Mt. Balanos, August 1952, Krauss.

DISTRIBUTION: Mariana Is. (Guam), Caroline Is. (Truk).

2. Simulium (Eusimulium) palauense Stone, n. sp. (fig. 2).

In addition to the characters illustrated and those given for the subgenus, the following are to be noted:

Female: Wing length 2 mm. Scape, pedicel, and base of first flagellomere yellow, remainder of antenna dark. Recumbent narrow scales of head, thorax and abdomen brown, with some yellow scales on scutum laterally and in front of scutellum; erect hairs of scutellum and abdomen dark. Hairs of pale parts of legs white, of dark parts brown, the two areas strongly contrasting. Hairs of stem vein dark. Halter pale yellow. Calcipala unusually large, reaching to apex of second hind tarsomere. Terga 8 and 9 dark, shiny.

Male: Scarcely differing from female except in the usual sexual characters of the eyes, tarsal claws, and somewhat more convex thorax. A gray pruinose area on side of tergite 2, at least.

Larva and pupa unknown.

Holotype, female (US 65052), Ngiwal, Babelthuap I., Palau Is., May 21, 1957, Sabrosky. Paratypes, Babelthuap, Palau Is. (US, BISHOP, CM), two females, two males, E. Ngatpang, 65 m., Dec. 8, 1952, Gressitt; female, male, same, December 9; female, seven males, same, December 10; male, Imeliik, June 6, 1957, Sabrosky; male, Ngerehelang, May 6-8, 1957, Sabrosky; female, Ulimang, December 10, 1947, Dybas.

DISTRIBUTION: Caroline Is. (Palau Is.).

3. Simulium (Eusimulium) guamense Stone, n. sp. (fig. 3).

In addition to the characters illustrated and those given for the subgenus, the following were noted on the pinned holotype before a slide preparation was made of it:

Male: Wing length 1.75 mm. Eye with upper and lower facets greatly contrasting, the upper facets reddish brown, large, each facet about 0.05 mm. in diameter; lower facets yellowish gray, small. Antenna about 0.4 mm. long, entirely pale yellow, the scape and pedicel with dark hairs, the flagellum with hairs pale yellow. First flagellomere slightly longer than pedicel. Face gray. Scutum dark brown, the humeri somewhat yellowish, the posterior declivity and sides above wing base paler and subshining. Scutellum brown. Pleura dark brown. No scales on prealar area. Wing veins pale yellow, the spines on costa jet black; hairs of stem vein black; a few hairs on basal part of radial vein. Halteres pale yellow. Coxae dark; trochanters yellowish; femora dark, the extreme base of each yellowish; fore tibia dark, the basal half pale, with pale hair; mid tibia dark, the basal third pale; hind tibia pale on basal half; tarsi dark, the first hind tarsomere yellow except for apical sixth. Abdomen dark

male, same, December 9; female, seven males, same, December 10; male,

except for yellowish-brown first segment, yellow second segment, and pale pollinose spots on sides of terga 4 and 5. Fringe on first abdominal segment yellow.

Female, larva, and pupa unknown.

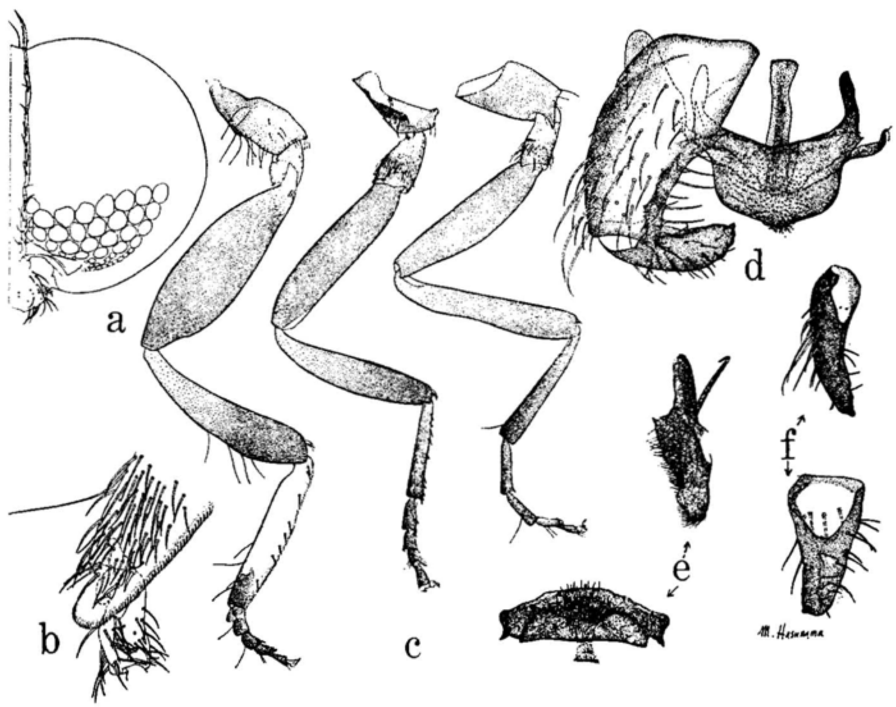


FIGURE 3.—*Simulium* (*Eusimulium*) *guamense:* **a,** head, male, front view; **b,** calcipala and pedisulcus, male; **c,** left hind, mid, and fore legs, male; **d,** terminalia, male, ventral view; **e,** ventral plate, male terminalia; **f,** distimere, male terminalia.

Holotype, male (BISHOP 3378). Umatak, Guam, Mariana Is., March 1958, Krauss.

DISTRIBUTION: Mariana Is. (Guam).

4. Simulium (Eusimulium) bonninense (Shiraki). (Figure 4.)

Eusimulium bonninense Shiraki, 1935, Taihoku Imp. Univ., Mem. Fac. Sci. Agric., **16**(1) : 21.

In addition to the characters illustrated and those given for the subgenus, the following are to be noted:

Female: Wing length 2.3 to 2.7 mm. Scape and pedicel dark reddish brown to black; flagellum nearly black with pale pubescence. Frons and clypeus pale gray, pollinose. Palpi dark. Recumbent narrow scales of head, thorax, and legs pale yellow or coppery; erect hairs of scutellum and posterior abdominal segments dark; fringe of first abdominal segment coppery yellowish. Hairs of stem vein dark. Halter orange yellow. Calcipala large, reaching beyond pedisulcus. Terga 3 to 7 dark, matt, 8 and 9 subshining. Base of abdomen ventrally yellowish.

Male, larva, and pupa unknown.

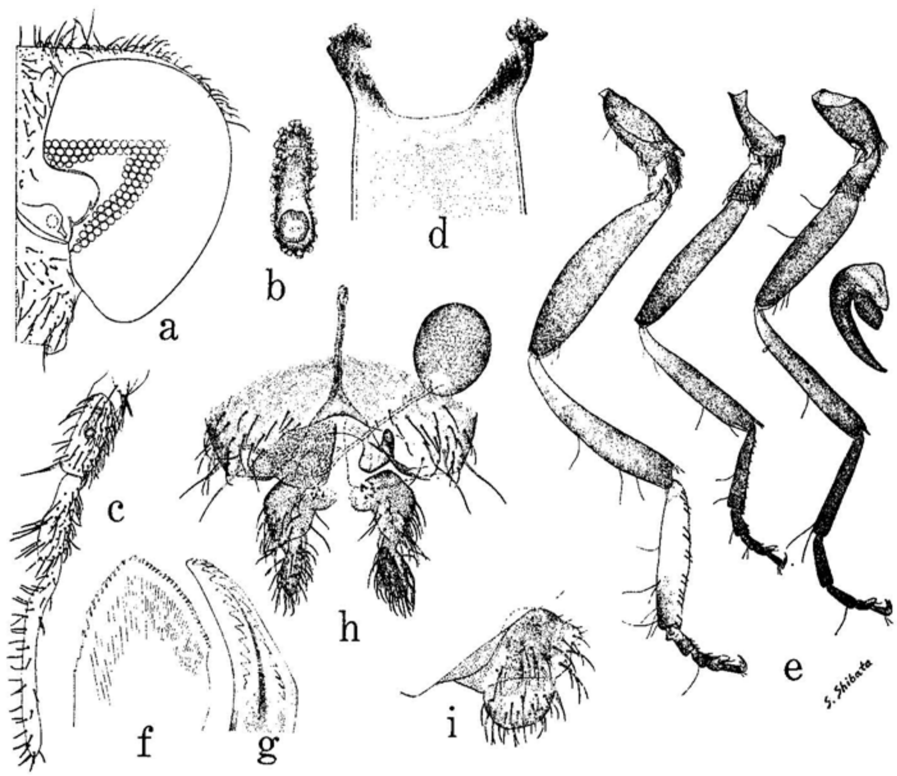


FIGURE 4.—*Simulium* (*Eusimulium*) *bonninense:* **a,** head, female, front view; **b,** palpal sensory vesicle; **c,** palpus, female; **d,** base of cibarium, female; **e,** left hind, mid, and fore legs, and claw, female; **f,** tip of mandible, female; **g,** tip of maxilla, female; **h,** female terminalia, ventral view; **i,** female terminalia, lateral view.

DISTRIBUTION: Bonin Islands.

BONIN IS. OGASAWARA: (single type female). HAHA JIMA: 13 females, April to June 1958, Snyder.

Although Shiraki gives the wing length as 2 mm. for the type, all of the specimens from Haha Jima have a wing length of 2.3 to 2.5 mm.